Solar Eclipse Notes

Professor Walter S. Harshman, formerly Superintendent of the American Nautical Almanac, has called my attention to a serious error in the charts published for the total solar eclipse of May 29, 1919, in both the American and the British Nautical Almanacs. The mathematical and charted data for this eclipse are precise duplicates in the two almanacs. The charts record the shadow band as passing thru the Gulf of Guinea, off the southwest coast of Africa, without touching the land bounding the gulf on the north. The fairly prominent landmark known as Cape Palmas is charted as lying entirely to the north of the eclipse path. This is in error. The coast line to the east and west of Cape Palmas is charted about two degrees of latitude north of where it really lies. The correct charting of this coast line places Cape Palmas very near the central line of the path.

Up to the present time the possibilities and promise of Cape Palmas and vicinity as a point of eclipse observation have been overlooked. The number of expeditions planning to observe the coming eclipse is apparently small. This is partly on account of the unsettled political conditions thruout the world and the difficulties and uncertainties of ocean transport arising therefrom, but also in great measure to the supposed unfavorable location of the shadow path. It is understood that the Cordoba Observatory of the Argentine Republic will dispatch an expedition to Brazil. The only other expeditions thus far announced are two from the British joint Permanent Eclipse Committee, one going to Sobral, Province of Ceara, Brazil, and the other to Princes Island, off the west coast of Africa. A note in an earlier number of these Publications called attention to the fact that the path crosses southern Peru, but very early in the morning, with the Sun too low for the making of favorable and accurate observations. The duration of totality in Brazil and West Africa is approximately five minutes. The maximum duration, which occurs near the mid-Atlantic, is nearly seven minutes.

Whether the availability of the Cape Palmas region will attract additional observers or change existing plans is not known. The eclipse date is too near to justify the sending of an American expedition to that point.

That so large an error in charting the north coast of the Gulf of Guinea should have occurred and remained undetected to date,

is both surprising and unfortunate. We at Mount Hamilton charted carefully the eclipse path upon accurate maps of South America, but we took no interest in the path of the shadow across Africa.

The personnel of the British Expedition to Brazil will be Father Cortie of Stonyhurst Observatory, and Mr. Davidson of the Royal Observatory at Greenwich. The British Expedition to Princes Island will be in charge of Professor Eddington of Cambridge University, who will be assisted by Mr. Cottingham.

Both British expeditions will limit their activities largely to one problem, that of "weighing light"—in the language of Professor Eddington—in which the purpose is to observe and measure the so-called Einstein effect. According to certain hypotheses, light radiations possess mass and are subject to gravitational disturbance. If the hypothesis in one form or another represents the truth, then rays of light proceeding from stars which are seen very nearly in the direction of the Sun should be deflected from their straight line courses, as those rays pass close to the Sun and thru the Sun's gravitational field. If a ray of light coming from a star to the eclipse observer just grazes the edge of the Sun but without touching the Sun, it should be bent from its course in amount $0''.87$, according to one hypothesis, in twice this amount on another hypothesis, or not at all on a still different hypothesis. The eclipse of May 29th occurs with the Sun very favorably situated for the solution of this problem in the northern part of the *Hyades* cluster. A good number of stars in the photographic field, with the eclipsed Sun in the center, may be recorded with an exposure of ten seconds or less. Many eclipses will come and go before another will be so favorable in this regard. This is a condition encouraging to the dispatching of expeditions, but the weather conditions normal to Brazil and Princes Island late in May may fairly be said to be correspondingly discouraging. It is unfortunate that the travel conditions to these somewhat out-of-the-way stations are disturbed and uncertain.

Popular Astronomy for March, 1919, publishes the path of the total solar eclipse of September 10, 1923, both in mathematical terms and as a large scale map, a contribution from Director Gallo of the National Mexican Observatory at Tacubaya. The central line of the shadow path enters the west coast of Lower California

at Todos Santos Bay, about fifty miles south of San Diego[1], California; passes about midway between Guaymos and Hermosillo on the Sonora railway; passes about midway between Torreon and Durango; enters the Gulf of Mexico about thirty miles south of Tampico; and enters the west coast of Yucatan about fifty miles south of Campeche. The eclipse in western Mexico will occur at approximately 2 P. M., and the duration will be about three and one half minutes of time. Professor Gallo promises a special publication concerning eclipse conditions in due time. It is to be hoped that he will be able to arrange for the making of weather observations at various points in or near the shadow path, during the first twenty days of September, 1919 to 1922 inclusive, *at the hour of the day when the eclipse will occur.* Weather observations made at the usual Weather Bureau hours of the morning and evening will have a certain value for eclipse observers, but what the observers really want to know are *the average conditions existing at 2 p. m. of September 10th.* These conditions may be extremely different from those of the morning and evening. The data supplied to prospective observers of the Russian eclipse of August 21, 1914, were based upon observations made in the morning and evening, and gave fair promise of clear skies for the eclipse. When the observers reached their stations in Russia they were surprised to find that, while the mornings, evenings, and nights were beautifully clear under settled weather conditions, the clouds began to form in the mid-forenoons and reached their maxima of almost complete cloudiness in the mid-afternoons, approximately at the eclipse hour. The Lick Observatory would not have sent an expedition to observe the Russian eclipse had we known of the existence of this diurnal factor of cloudiness, to which the published weather data had not referred. Similarly, the data prepared by the U. S. Weather Bureau for the guidance of prospective observers on June 8, 1918, in the State of Washington and elsewhere, having been based upon observations made at the Weather Bureau hours of morning and evening, failed to note the distressing fact that high winds developed in the middle of the day and reached their maximum strength at approximately the hour of the eclipse. These winds and the attendant dust storms were distressing to the bodies and souls of the astronomers, who had not known of these peculiarities.

[1]According to Gallo, San Diego, California, is well within the shadow path.

It would seem that weather observations made at the time of the day that the eclipse is to occur promise vastly greater usefulness to intending observers than the usual observations made in the mornings and evenings.

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MEASURES OF Σ208 AND Σ1834

The following measures may be of interest in connection with Professor Eric Doolittle's "Study of the Motions in Σ208, 10 *Arietis*, and in Σ1834," published in *Astron. Jour.*, **33**, 9 (February 13), 1919. Professor Doolittle's object was to determine whether the observations of these pairs could be represented on the theory that the relative motion in each was rectilinear; that is, that the components in each case were independent stars passing each other by virtue of their proper motions and not members of a binary system. He concludes that such representation is impossible and that each system is a binary. This was to be expected, and, so far as they go, my measures are confirmatory. The measures are:

		Σ208	
1915.829	112°.8	0″.38	1n 36-inch, "very difficult."
1916.951	117 .1	0 .35	1n 36-inch, "fair conditions."
		Σ1834	
1914.58	86°.0	0″.22	2n 36-inch, "good."
1916.38	87 .0	0 .28	2n 36-inch, "good."

If the motion in Σ1834 were rectilinear the companion should be in the third quadrant (266°.0 and 267°.0), and the residuals (O-C) for my measures of the two systems would be:

	Σ208	
	Δθ	Δρ
1915.83	− 7°.2	−0″.25
1916.95	−· 8 .6	−0 .28
	Σ1834	
1914.58	−17°.3	−0″.20
1916.38	−17 .1	−0 .22

These are entirely too large to be attributed to error of observation. Moreover, on the best two nights, the following star in Σ1834 seemed to me the fainter, tho there is but little difference in the brightness of the components.

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